TOWN CENTER NEIGHBORHOODS
TRAFFIC CALMING PROCESS

Phase 1: West End

History and Staff Technical Analyses

Traffic & Transportation Division
November 22, 2004

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EXECUTIVE SUMMARY

Town Center Traffic Calming Process

A process has been established to proactively address the impacts of projected additional volumes of traffic generated from the redevelopment of Rockville Town Center and regional growth. Phase one of that process has entailed a series of meetings and discussions with citizens from the West End neighborhood to review existing traffic calming facilities (Attachment A) and to recommend traffic calming and pedestrian safety alternatives.

The recommended alternatives discussed below are West End-specific and are separate from alternatives that will be developed with other neighborhoods surrounding Town Center. Staff anticipates that by spring 2005 meetings with other neighborhoods will have taken place and each neighborhood will have recommended alternatives. At that time, staff will present a final series of recommended alternatives based on previous work with several different neighborhoods.

The goal of the final phase of staff recommendations for traffic calming alternatives is to proactively enhance safety and protect neighborhoods from cut-through traffic, while maintaining access for residents.

West End Traffic Calming

Several West End neighborhood streets run parallel or perpendicular to primary access routes such as MD 28/West Montgomery Ave. and Great Falls Road that lead to Town Center. Due to existing and projected over-capacity of these routes during peak hours, drivers will often experience poor levels of service and may choose to diverge from these routes and use West End neighborhood streets as cut-throughs to reach Town Center. West End citizens are concerned that these additional volumes will negatively affect their quality of life and jeopardize the safety of motorists, pedestrians, and bicyclists.

To address concerns about safety and access, the West End Citizens Association (WECA) convened community meetings from July to October 2004 to discuss previously recommended and future potential safety improvements and cut-through traffic remedies.

On July 20, 2004, the WECA Traffic Committee met to review recommendations made by the West End Traffic Management Advisory Group (WETMAG) in its 1991 report entitled "Integrated Traffic Management Program for the West End Neighborhood." The Traffic Committee invited staff to attend and to present WETMAG recommendations that had been implemented since 1991. Staff also presented additional measures that have been implemented but were not part of the WETMAG report. (See Attachment B).

On August 16, the WECA Traffic Committee convened another meeting with the community to vote on whether or not to implement traffic calming and pedestrian safety measures discussed during the July meeting. Results of the votes are listed in Attachment C. Staff attended this meeting to listen to the community's perspectives.

WECA representatives and staff met on August 19 and September 15 to discuss measures agreed to by citizens during the community meetings. Staff also presented alternatives not discussed at the WECA Traffic Committee meetings. The President of WECA indicated that the WECA Executive Board would review and vote on the final alternatives before presenting ideas at a larger West End community meeting.

Proposed Solutions from WECA

On September 22 the WECA Executive Board voted unanimously to support the implementation of the following facilities, which are different from those recommendations voted upon at the two Traffic Committee meetings in July and August:

- Add a 3-way Traffic Stop to the following intersections:
  1. Nelson and Anderson
  2. Forest and Harrison
  3. Evans and Laura
  4. Nelson and Beall
  5. Van Buren and Harrison

- Add a 4-way Traffic Stop to the following intersections:
  1. Anderson and Mannakee
  2. Beall and Forest
  3. Carr and Mannakee
  4. Monument and Great Falls
  5. Beall and New Market

A map of these facilities is shown in Attachment D. In addition, an email from the WECA President to the Chief of Traffic and Transportation outlines these and other measures recommended by the WECA Executive Board (See Attachment E).

On October 12, WECA hosted a full West End community meeting to present the recommendations outlined in the 1991 WETMAG report and the Stop sign recommendations from the WECA Executive Board. The community voted in support of the Stop sign concept at the ten intersections, and requested to add 3-way traffic Stops at two additional intersections – W. Argyle St. and S. Washington Ave. (See Attachment F for minutes from that meeting).

Staff Recommendations

Traffic calming in the West End must support the following three objectives:

1) Minimization of cut-through traffic and control speeds,
2) Maximize accessibility to Beall Elementary and to residences, and
3) Protect neighborhoods from traffic calming measures that might divert traffic from one neighborhood to another neighborhood.

To adequately address the objectives of limiting cut-through traffic to Town Center and creating a safe environment for motorists, pedestrians, and bicyclists, staff recommends turn restrictions at several intersections and a traffic circle at the intersection of Forest Ave. and Beall Ave. The Stop signs would have a minimal impact on cut-through traffic and allow drivers to continue to use West End streets to save time; the combination of drivers rushing through the community and students walking to school creates a worst-case scenario for unwarranted Stop sign installations. Applying turn restrictions improves pedestrian safety at intersections and keeps

vehicles destined for the Town Center off West End streets by preventing drivers from cutting through the neighborhood.

The 1991 WETMAG plan includes diversions that would achieve the first objective, but not the second and third objectives. WECA's currently proposed Stop sign request does not achieve any of the objectives listed above. The following section explains why this is the case.

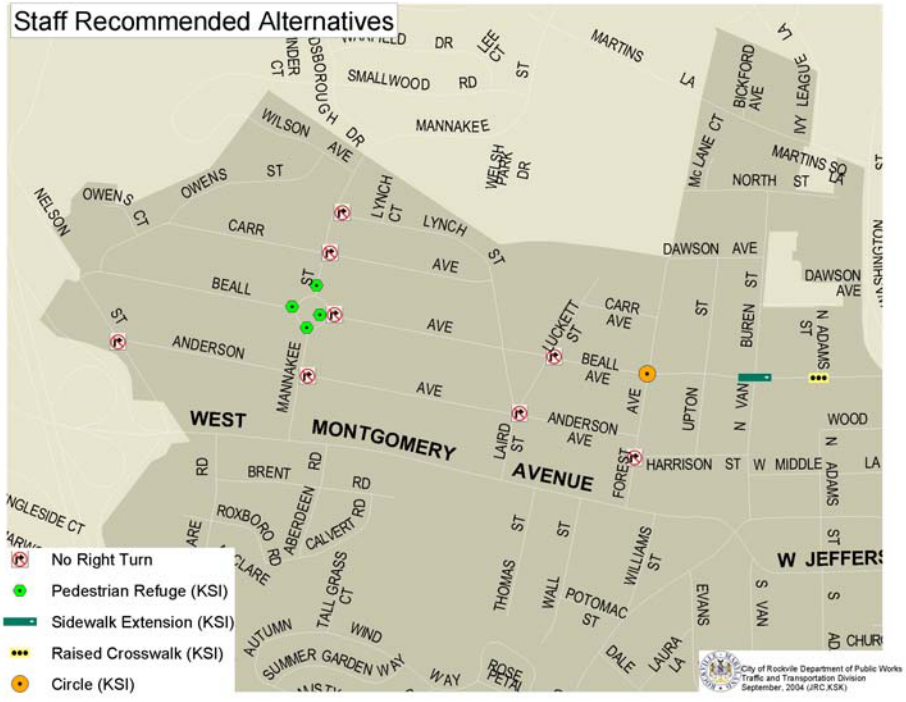
Stop Signs

In response to the West End community's request to apply all-way Stop controls at twelve intersections, staff conducted traffic studies to determine if the intersections met warrants for Stop signs. The methodology for the studies included collection of traffic volume and accident data, performing field investigations and analyzing the physical structure of the intersections (see Attachment G for further detail). Staff also referred to sections 2.B.05 and 2.B.07 of the 2003 Manual on Uniform Traffic Control Devices (MUTCD), which states that Stop signs should not be used for speed control.

Staff recommends that all-way Stop controls should not be applied at any of these intersections because of the MUTCD standard, and because of the fact that neither the warrants nor the city "relaxed" warrants were met for such traffic control devices. The MUTCD and the city "relaxed" traffic volume warrants need to be met for eight and six hours, respectively, but those warrants were not met at any single hour at any intersection. The accident history warrants were not met either at any intersection during the latest available three-year period (2000-2002).

Recommended Alternatives

Staff recommends implementing a series of turn restrictions in the West End to disrupt cut-through traffic, address volumes heading east-west from Rockville Town Center, and to maintain access to Beall Elementary School and to residences. The map below shows an image of the proposed locations for turn restrictions (also shown as Attachment H).



In this scenario, primary access to Town Center would remain on MD 28/West Montgomery Ave. and Great Falls Road. Peak hour traffic heading to Town Center would be restricted from using residential Streets that run parallel to MD 28. These roadways include Anderson, Beall, Carr, and Harrison as access to Town Center. In addition, access to Beall Elementary School and to points further north, such as Montgomery Community College, would remain open via Laird St., Mannakee St., and Nelson St.. By maintaining northbound access at Mannakee and Laird, traffic is not redirected from destinations within the West End.

Staff remains concerned that Beall Ave. must be safe for pedestrians but open for traffic destined to Beall Elementary School. Therefore, staff recommends that the conditions of approval for the KSI development (PDP2003-00006) be implemented. Condition number 2 of the KSI staff report (PDP2003-00006) states:

> *"Prior to the issuance of a building permit, the Applicant shall construct the following traffic calming devices as approved by DPW to mitigate the impact of the project on the Beall Ave. corridor:*
>
> *a. Construct a landscaped median entry feature and raised crosswalk on Beall Ave. near Adams St*
> *b. Construct a mini-circle and associated roadway improvements at the intersection of Beall Ave. and Forest St..*
> *c. Construct a 4' minimum sidewalk and buffer connecting the sidewalk on the south side of Beall Ave. between the existing sidewalk on Van Buren and North Adams.*
> *d. Construct pedestrian refuges at all four legs of the Mannakee Circle at Beall Ave.*
> e. *Furnish the City with a portable speed indicator sign for use within the West End neighborhood."*

These conditions were crafted to minimize cut-through traffic and maximize pedestrian safety. Attachment I is correspondence from the President of WECA describing the neighborhood's opposition to the proposed traffic circle referenced in condition 2.b.

Sidewalks
In response to the West End community's requests for sidewalk installation and/or improvement along several streets in the West End neighborhood, City staff has conducted a study of costs involved with the implementation of these requests. Due to time constraints, staff was unable to make a detailed technical analysis of each requested sidewalk, but the estimated costs in the table below represent ballpark figures and Staff's best efforts to generate accurate numbers within the limited time frame. To view the methodology for estimating costs and detailed cost elements, including 1) removal of trees and other vegetation, 2) relocation of utility poles, and 3) curb and gutter work, refer to Attachment J.

Requested Location	Cost Estimate Range
Lynch St. from Beall to Anderson (West Side) **(CIP)**	$46,300 - $56,588
Lynch St. from Beall to Anderson (East Side)	$110,484 - $135,036
Lynch St. ***brick*** from Beall to Anderson (East S.)	$162,203 - $198,248
Luckett St. from Beall to Anderson (West Side)	$41,904 - $51,216

Luckett St. from Beall to Anderson (East Side)	$47,250	-	$57,750
Mannakee St. from Beall to Carr (West Side)	$15,093	-	$18,447
Harrison St. (North Side)	$59,688	-	$72,952
Harrison St. (South Side)	$96,660	-	$118,140
Forest Ave. from Beall to Dawson (West Side)	$64,134	-	$78,386
Forest Ave. from Beall to Dawson (East Side)	$112,266	-	$137,214
Anderson Ave. from Nelson to Forest (North Side)	$330,102	-	$403,458
Anderson Ave. from Nelson to Forest (South Side)	$567,306	-	$693,374
Argyle St. from Maryland to Monroe (North Side)	$108,459	-	$132,561
Argyle St. from Maryland to Monroe (South Side)	$90,441	-	$110,539
Beall St. from Nelson to Lynch (North Side) **(CIP)** *(Improvements to asphalt sidewalk)*	$36,000	-	$44,000
Total West End Sidewalk Improvements:	**$1,690,087**	-	**$2,065,661**

Note: The cost ranges represent (+) and (-) 10% of Staff's determined estimates

Based upon cost and technical feasibility, Staff recommends the following as **priority improvements**:

1. South side of Beall Ave. between the existing sidewalk on N. Van Buren St. and North Adams St.: This portion of sidewalk is listed as condition 2.c. in the staff report for approval of the KSI development. This portion provides access to Beall Elementary School and to Town Center.
2. West Side of Lynch St. from Beall Ave. to Anderson Ave.: Installing a sidewalk here provides an important access link to Beall Elementary School. While the west side of the St. is amenable to infrastructure modification, the east side features severe grading problems and utility poles as costly obstacles. This project is listed in the current Pedestrian Safety CIP.
3. West Side of Mannakee St. from Beall Ave. to Carr Ave.: This requested segment is the least expensive of the potential projects due to its relatively short distance and lack of extraordinary installation issues. At this location, curb and gutter, and concrete driveway aprons are already present. Existing utility poles can remain because the sidewalk would run behind them, leaving a buffer to the St..
4. West Side of Forest Ave. from Beall Ave. to Dawson Ave.: The west side of Forest presents few major problems for sidewalk installation, with the exception of one or two trees. For the most part, a clear corridor extends along the pavement edge (or curb, North of Carr Ave.). A sidewalk here would provide an access link to the trail to the Rockville Swim Center.
5. North Side of Beall Ave. from Lynch St. to Nelson St.: In order to comply with a 4' width standard, the asphalt sidewalk along Beall should be widened and patched at appropriate spots. This project is listed in the current Pedestrian Safety CIP.

Refer to Attachment K to view field pictures and aerial photos of these priority locations.

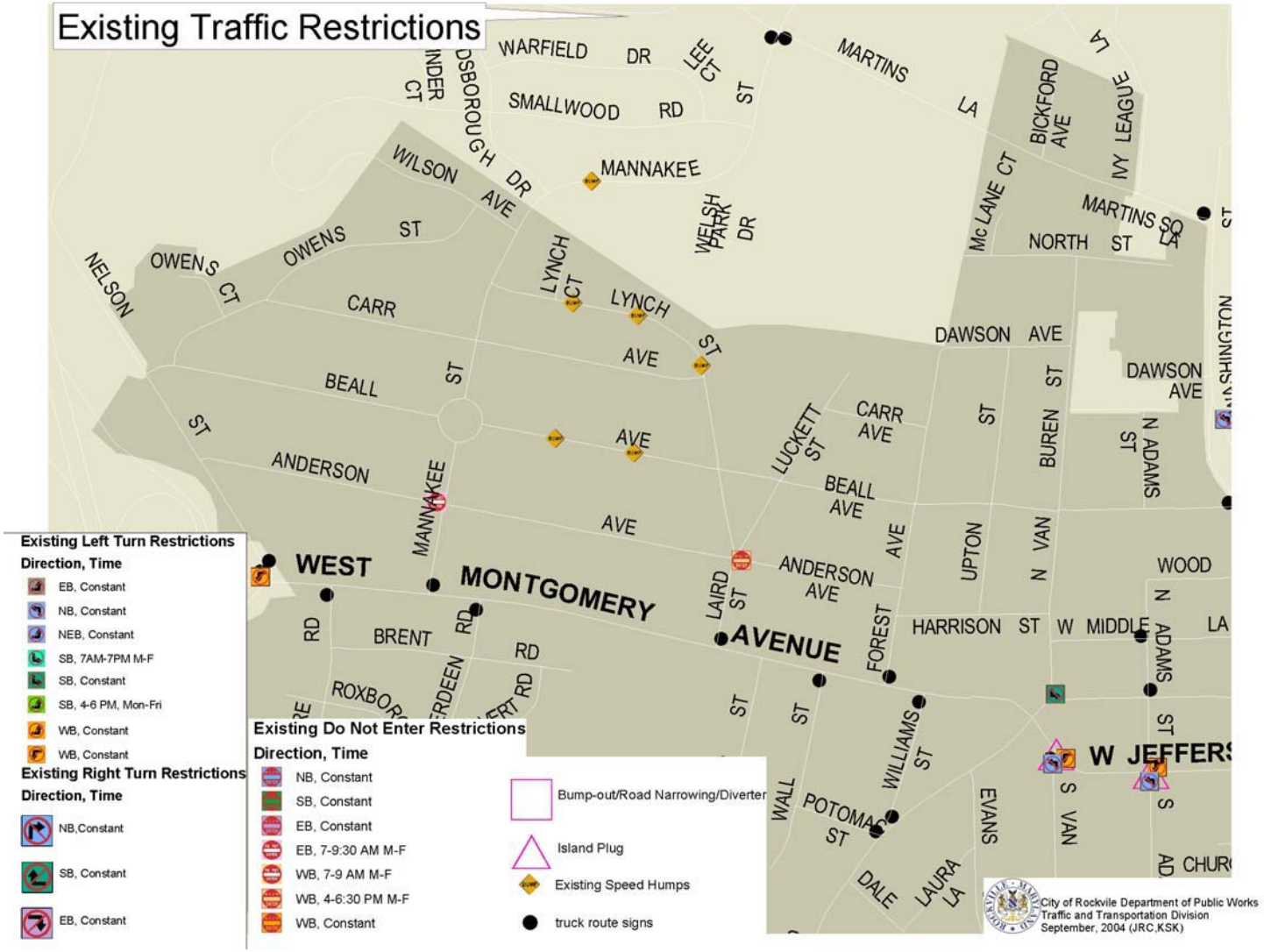
The following areas contain **severe obstructions** to sidewalk installation:

- South Side of Argyle St. from Maryland Ave. to Monroe St.: Several large, old trees are situated along this segment that may act as obstacles, and there are severe slopes close to Maryland Ave..
- Anderson Ave., East of Mannakee: Just east of Mannakee, on both sides of Anderson Ave., the presence of large trees and grading problems make sidewalk installation infeasible, unless the community supports the disruption and Mayor and Council finance the estimated $100,000 required for this improvement.
- South Side of Anderson Ave.: In addition to the location just east of Mannakee, other major obstructions exist on the south side of the St., including sites just east and just west of Laird.

Refer to Attachment L to view field pictures and aerial photographs of obstructed areas.

During the sidewalk evaluation process, staff accumulated a host of field and aerial photographs for the locations under study – not just those cited above. These are catalogued in Attachment M to show the possibilities and problems associated with installation.

ATTACHMENT A: MAP OF EXISTING TRAFFIC CONTROLS



ATTACHMENT B: MEETING MINUTES OF JULY 20, 2004

West End Traffic Calming Meeting Minutes

On the evening of Tuesday, July 20, 2004, City staff met with community members to discuss proposed and existing traffic calming strategies for the West End. The meeting sought to address recommendations made by the West End Traffic Management Advisory Group (WETMAG) in its 1991 report, and to generate dialogue concerning remaining issues. City staff presented a table (see attached) of these recommendations and facilities implemented, as well as mitigation measures that have been implemented but were not part of the 1991 WETMAG report.

The following text summarizes the minutes of the July 20th meeting, with follow-up items shown in **bold**:

1. West End residents and City staff began the meeting by discussing the format for the development and implementation of future traffic calming measures. Residents and staff agreed to a series of three meetings, during which participants would:
   a) Create an overarching plan and implementation schedule;
   b) Reach consensus on projects;
   c) Map out subsequent steps; and
   d) Devise a system for periodic review. (Once residents validate a plan, it will be necessary to determine if implemented facilities are effective).

2. West End residents and City staff determined that the following reports are pertinent to current efforts, and should be reviewed.
   a) A pedestrian study performed for the 1991 WETMAG Plan
   b) A Mayor & Council sidewalk implementation plan created in the mid-1990's
   c) The West-End curb and gutter plan.

* * *

Note: Below, minutes coincide with items on the attached table -- City document titled *History of West End Traffic Concerns: West End Community Recommendations and City Responses*.

I. Traffic Diversion

1. "NO LEFT TURN 7:00-9:30 AM" restriction from West Montgomery at Mannakee. Status: turn restriction not implemented.

2. City Staff confirmed for West End residents that Rockville has assumed jurisdictional control over Great Falls Road. Staff showed the 2001 transfer memo as documentation. This document confirms that truck traffic must remain on Great Falls Road. Status: jurisdictional transfer has been implemented.

3. "NO LEFT TURN 7:00-9:30 AM" restriction from W. Montgomery at Laird. Status: not implemented.

4. "NO LEFT TURN 7:00-9:30 AM" restriction from W. Montgomery at Forest. Status: not implemented.

5. "NO RIGHT TURN 7:00-9:30 AM" restriction from Nelson St. to Anderson Ave. Status: turn restriction onto Anderson from Nelson is not implemented, but restrictions exist on Anderson between Mannakee and Laird.

6. "NO RIGHT TURN 7:00-9:30 AM" restriction from Nelson St. to Beall Ave. Status: turn restriction onto Beall from Nelson is not implemented, but truck restrictions exist on Beall between Mannakee and Laird.

7. Westbound Controls proposed in the 1991 WETMAG Report aimed to limit cut-through traffic. Status: westbound turn controls have not been implemented.

8. Stand alone controls on Mannakee, Lynch, Luckett, and Carr. Status: this group of stand-alone controls has not been implemented; however, three speed humps built on Lynch between Lynch Ct. and Carr Ave. aim to serve as substitute calming measures.

9. Residents expressed consensus for better traffic enforcement on Beall Ave. In 2003, the City implemented a doubling of fines on Beall, near the school.

10. Turn restriction on Monument St. and the possibility of installing a signal at the intersection of Monument St. and Great Falls Road to make access to Julius West Middle School safer. Status: turn restriction not implemented**; the City plans to conduct a signal warrant study in September.**

11. The 1991 WETMAG Report advised a "Woonerf" (road narrowing) demonstration on Beall Ave.. Status: not implemented.

12. Community members asserted that DO NOT ENTER signs are regularly violated.

Traffic Diversion Summary: To date, none of the twelve (12) recommendations as stated in the WETMAG Report have been implemented. However, as detailed in the attached table, the City has enacted eight (8) related volume and speed control measures in the West End since 1991. These items are listed in section 5 of these minutes.

II. Pedestrian and Bicycle Ways

1. Sidewalk on Lynch from Beall to Anderson. Status: not implemented, **but shown in FY05 CIP**.

2. Sidewalk on Harrison St.. Status: not implemented.

3. Sidewalk on Anderson from Nelson to Forest. Status: not implemented.

4. Sidewalk on Argyle from Monroe to Maryland. Status City staff created a CIP project for this sidewalk, but it is unfunded. Status: sidewalk on Argyle has not been implemented.

5. Sidewalk on Luckett from Beall to Anderson. Status: not implemented, but **funded in the FY05 CIP.**

Pedestrian and Bicycle Ways Summary: The above items only references projects that have not been implemented. However, eleven (11) of seventeen (17) recommendations made in the 1991 WETMAG Report have been applied (see attached table).

III. Truck and Arterial Traffic

1. City staff reiterated that control of Great Falls Road transferred from the State to the City in 2001. The agreement was distributed to interested parties, and staff confirmed that the State insisted on trucks remaining on Great Falls Road. Status: jurisdictional transfer has been implemented. **Staff will supply background information to Bob Bolcik on the decision making process.**

2. The following truck restrictions exist on West End City streets:

a) Truck traffic is prohibited on Maryland Ave. from Great Falls Rd. to West Jefferson St.
b) After exiting I-270 interchange to Maryland Ave., trucks are allowed to use only Great Falls Rd. to reach the Town Center.

3. Traffic signs at I-270 interchanges (forbidding truck traffic greater than 1 ton on Maryland Ave.) were installed in 1989. West Montgomery Ave. and Great Falls Road still allow truck access, as required by the State. Status: signs have been implemented.

4. West End residents expressed concern about excessive traffic noise on West Montgomery Ave.. Status: **staff will monitor truck speeds, volumes, starting the week of August 1, 2004**.

5. West End residents asserted that the City should better promote alternate routes for truck and arterial traffic. Further, residents requested that signage indicating alternate routes be improved on I-270. Status: not implemented, but **a letter has been drafted by the City to the State. Staff will copy Bob Bolcik on transmittal and provide draft prior to mailing.**

6. West End residents claimed that the speed indicator sign has done nothing to reduce speeds on arterial roadways. City staff is researching the legal possibility of doubling fines on Maryland, Great Falls, and W. Montgomery because these roadways are near schools. Participants at the meeting also discussed the idea of constructing traffic circles in targeted locations on the aforementioned roads. Status**: City staff will monitor the speed on Maryland Ave., near the speed indicator sign, to assess the impact of the sign.**

Truck and Arterial Traffic Summary: Two (2) of five (5) recommendations as stated in the 1991 WETMAG Report have been implemented. The City has enacted additional measures to mitigate truck and arterial traffic as well (see attached table).

IV. Speeding and Traffic Enforcement

1. West End residents proposed that the City publish highlights from this and following meetings in both the West End newsletter and in *Rockville Reports*. **Bob Bolcik volunteered to contact the Gazette to disseminate relevant West End traffic information.**

1. City staff explained that the City cannot control the state law regarding fines for speeding violations. Residents requested that the City enact Drivers Ed programs for traffic violators (per the Police Department). Status: amendment of fines and Drivers Ed programs not enacted.

2. Residents requested that the WRITE program (citizen reporting license plate information of traffic violations to City Police – warning issued) be advertised in the *Rockville Reports*. Staff will advertise program.

3. Residents supported more speed counts in the **West End neighborhood and agreed to advise the Traffic & Transportation Division on the optimal location of counters** (i.e. where speed violations are occurring).

   a) City staff will perform speed counts on Nelson in the Fall of 2004
   b) City staff will speak with the Chief of Police about the appropriate location of speed counters in conjunction with the approval of the KSI use permit, including Carr Ave..

4. West End residents recommended better utilization of public relations techniques to affect traffic behavior.

a) Schools can make stronger efforts to raise awareness and affect change.

Speeding and Traffic Enforcement Summary: One (1) of six (6) recommendations as stated in the 1991 WETMAG Report have been implemented. The remaining recommendations are either outside the City's jurisdictional authority or in the process of implementation.

V. Completed Improvements Not Recommended in the '91 Report

1. **City staff notified community members that the speed hump on South Washington would be constructed after the road is resurfaced this fall.**

Completed Improvements Summary: City staff has implemented eight (8) additional traffic control measures in the West End since the 1991 Report. These include:

a) Two speed humps on Beall Ave. (1996)
b) Two speed humps on Lynch St. (1997)
c) A third speed hump on Lynch St. (1999)
d) A physical turn restriction on South Adams, at MD 28 (2002)
e) A physical diverter on Argyle St., at Maryland Ave. (2002)
f) Two speed humps on Argyle St. (2002)
g) A speed indicator sign on Maryland Ave. (2003)
h) Two speed humps on Mannakee St., leading to the West End (2003).

VI. Plans for Next Meeting

1. West End residents and City staff agreed to cover the following items at the next meeting:
   a) Develop recommendations on each traffic calming or diversion in the 1991 plan;
   b) Add any items and / or problem areas not addressed in the 1991 plan;
   c) Discuss strategies for truck circulation from the I-270 corridor;
   d) Begin to develop an implementation plan for the recommendations.

2. For the next meeting, City Staff has agreed to supply the following documents:
   a) Meeting Minutes
   b) Copies of the 1989 West End Neighborhood Plan
   c) Copies of the Mayor & Council Pedestrian Plan, designed in the mid-1990s.
   d) Draft of letter to MD SHA regarding truck and regional traffic exiting I-270.

VII. OTHER BUSINESS

1. City staff reminded the audience that the Akridge (RCI) residential / retail application is under review by the City and encourage comments from the community. Transportation recommendations will be forwarded to Bob Bolcik when completed by staff.

ATTACHMENT C: MEETING MINUTES OF AUGUST 16, 2004

West End Traffic Calming Meeting Minutes
August 16, 2004

Participants:
Residents: Bob Bolcik, Jacques Gelin, Dennis Cain, B. Abert, Aaron Fein, Sally Stinner, Marcella Bowell, Sherry Dionne
City Staff: Katherine Kelly, Larry Marcus, Catherine Tuck Parrish

Overview:
Bob Bolcik reviewed outcomes of the July 20 meeting, namely to review items listed in the 1991 West End Traffic Management Advisory Group (WETMAG) report. He reiterated that the goal of this second focus group meeting was to reach consensus on whether or not to recommend implementation of those measures and to discuss potential other traffic calming measures not listed in the 1991 report.

Discussion Points from the 1991 Plan
The following table outlines the measures discussed, further discussion notes, and final resident votes on whether or not to recommend the measure:

I. TRAFFIC DIVERSION PLANS		
Community Recommendations	**City Responses**	**Discussion Points and Final Vote**
(Eastbound Controls) "NO LEFT TURN 7:00 – 9:30 A.M." from West Montgomery at Mannakee	*Volume Controls Implemented:* • Trucks restricted from entering Mannakee from W. Montgomery	Discussion: None. **Vote**: Yes, implement this measure.
"NO LEFT TURN 7:00 – 9:30 A.M." from West Montgomery at Laird	*Volume Controls Implemented:* • Trucks restricted from entering Laird from W. Montgomery	Discussion: Rationale for this measure is to limit cut-through. Concern about parents and teachers getting to school. An option is to put a light at Aberdeen or Adclare. Laird would be a good portal to allow for access and serve as a traffic control. **Vote**: Yes, implement this measure.
"NO LEFT TURN 7:00 – 9:30 A.M." from West Montgomery at Forest	*Volume Controls Implemented:* • Truck Restriction sign onto Forest Ave. from W. Montgomery	Discussion: An option is to make the restriction only until 8:30, to allow for school traffic. This option was denied but a majority of the group—they felt it would be too confusing and that all restriction signs throughout West End should have uniform times. **Vote**: Yes, implement this measure.

I. TRAFFIC DIVERSION PLANS		
Community Recommendations	**City Responses**	**Discussion Points and Final Vote**
"NO RIGHT TURN 7:00 – 9:30 A.M." from Nelson at Anderson	*Volume Controls Implemented:* • DO NOT ENTER signs prevent access onto Anderson Ave. stretch from Mannakee and Laird Streets (1990).	Discussion: A portion of this restriction exists today. **Vote**: Yes, implement this measure.
"NO RIGHT TURN 7:00 – 9:30 A.M." from Nelson at Beall	*Volume Controls Implemented*: • Trucks restricted from entering Nelson from W. Montgomery. *Speed Controls Implemented:* • Traffic circle exists, two speed humps/raised crosswalks installed along Beall from Mannakee to Laird ('96, '97)	Discussion: None. **Vote**: Yes, implement this measure.
(Westbound Controls) "DO NOT ENTER 4:00 – 6:00 P.M." that prohibits entry onto Beall westbound, at N. Van Buren	*Volume Controls Implemented:* • Truck restrictions from N. Washington St. onto Beall	Discussion: Questions were asked about the purpose of this restriction. **Vote**: Yes, implement this measure.
"DO NOT ENTER 4:00 – 6:00 P.M." that prohibits entry onto Van Buren southbound, at Beall		Discussion: Options were looked at to ensure cut-through trips were captured. **Vote**: Yes, implement this measure.
"DO NOT ENTER 4:00 – 6:00 P.M." that prohibits entry onto Middle Lane westbound, at N. Adams		Discussion: Options were looked at to ensure cut-through trips were captured. **Vote**: Yes, implement this measure.

I. TRAFFIC DIVERSION PLANS		
Community Recommendations	**City Responses**	**Discussion Points and Final Vote**
Other Stand-Alone Controls) Place turn control on Lynch St. at Mannakee and/or at the Lynch / Luckett one way pair	*Speed Controls Implemented:* • Three speed humps built on Lynch between Lynch Ct. and Carr Ave. (1997-1999) • Existing traffic circle, plus two speed humps/raised crosswalks installed along Beall from Mannakee to Laird (1996, 1997) *Volume Controls Implemented:* • Do not Enter sign prevents access to Anderson St. from Lynch and Laird Streets	Discussion: The description of this measure is not clear. There was discussion about increasing speed limit on Carr to 25 MPH and installation of speed humps. Before voting, two questions are to be researched are: 1) is Carr speed limit 15 or 25 MPH?; 2) can speed limits under 25 be enforced? *Note:* ∗ Speed limit heading west on Carr from Lynch to Owens is 25MPH ∗ Speed limit heading east on Carr from Owens to Lynch is 15 MPH ∗ Speed limit heading west on Carr from Forest to Luckett is 15 MPH ∗ Speed limit heading east on Carr from Luckett to Forest is 25 MPH **Vote**: None.
Install a small traffic circle within existing right-of-way at the intersection of Beall Ave. and Forest Ave.	*Volume Controls Implemented:* • A condition of development approval requires KSI to construct a mini-circle and roadway improvements at intersection of Beall Ave. and Forest St.	Discussion: Participants support this concept. **Vote**: Yes, implement this measure.
Apply a part-time turn restriction on either end of Monument St.		Discussion: An option is to eliminate parking on one side of the St.. The City will do traffic volume and speed counts on Monument St. **Vote**: No, do not implement this measure.
Build a "Woonerf" demonstration project on one of the shorter blocks on Beall – i.e. traffic calming that applies St.-narrowing, curb installation and the addition of parking enclaves		Discussion: This project would enhance pedestrian safety and slow traffic near the school. **Vote**: Yes.

II. PEDESTRIAN AND BICYCLE FACILITIES		
Community Recommendations	**City Responses**	**Discussion Points and Final Vote**
Sidewalks *(First Year)* Complete an adequate, contiguous sidewalk on Beall Ave. from Nelson to N. Washington (on at least one side of St.)	Sidewalks exist along Beall Ave. from Nelson to N. Washington. These sidewalks are not contiguous on one side of the St. but are connected via crosswalks where not contiguous. Also, in 2001, .27 miles of sidewalk were replaced from Luckett to N. Van Buren St. as part of Access 2000 funding.	Discussion: There is concern for children walking to school. From Forest to N. Van Buren there should be contiguous sidewalk on at least one side of the St.. **Vote**: Yes, implement this measure.
Improve present sidewalk on Laird St. from W. Montgomery to Anderson	Implemented and complete.	Discussion: This project is completed. **Vote**: NA.
Install an adequate, contiguous sidewalk on Lynch St. from Beall to Anderson (on at least one side of St.)	Not implemented	Discussion: This project is listed in a CIP. **Vote**: Yes, implement this measure.
Install a sidewalk on Maryland Ave. from Falls Rd. Interchange to S. Washington (on both sides of St.)	Implemented and complete.	Discussion: This project is completed. **Vote**: NA.
Improve the sidewalk on Great Falls Road from Falls Rd. Interchange to W. Montgomery / MD 28 (on at least one side of St.)	Bicycle path and sidewalk were implemented in 2002.	Discussion: This project is completed. **Vote**: NA.
(Second Year) Complete sidewalk on Carr Ave. from Owens to Mannakee	Implemented and complete.	Discussion: This project is completed. **Vote**: NA.
Install sidewalk on Mannakee St. from Beall to Carr (on at least one side of St.)	Implemented and complete.	Discussion: This project is completed. Requests sidewalks on *both* sides of the St.. Vote: Include *both* sides of the St..
(Third Year) Install sidewalk on Dale Drive from Great Falls Road to Evans (on at least one side of St.)	Implemented and complete.	Discussion: This project is completed. **Vote**: NA.
Install sidewalk on Harrison St. (on at least one side of St.)	Not implemented	Discussion: **Vote**: Yes, implement this measure.
Install sidewalk on Middle Lane from Van Buren to N. Adams (on at least one side of St.)	Implemented and complete.	Discussion: This project is completed. Vote: NA.

II. PEDESTRIAN AND BICYCLE FACILITIES		
Community Recommendations	**City Responses**	**Discussion Points and Final Vote**
(Fourth Year) Install sidewalk on Anderson Ave. from Nelson to Forest (on at least one side of St.)	Not implemented	Discussion: **Vote**: Yes, implement this measure.
Install sidewalk on Argyle St. from Monroe to Maryland (on at least one side of St.) if residents request	Not implemented.	Discussion: This project is listed in a CIP. **Vote**: Yes, implement this measure.
Improve present sidewalk on Luckett from Anderson to Beall to City standard	Not implemented	Discussion: This project is listed in a CIP. **Vote**: Yes, implement this measure.
Crosswalks Place signalized crosswalks at controlled intersections on W. Montgomery Ave: *Priority Locations* • Intersection of W. Montgomery and Nelson • "Hot right" merge from I-270 onto W. Montgomery	Intersection to be reconstructed in Fall 2004. Will include crosswalks at controlled intersections.	Discussion: This project is underway. **Vote**: NA.
Bike Routes Mark current bike routes with appropriate signage, markings, and roadway / bikeway separation	Implemented and completed as part of Bicycle Master Plan, 2004.	Discussion: This project is completed. **Vote**: NA.
Connect West End bike routes to useful destinations – for instance, connect end of proposed bikeway at Middle Lane and N. Washington St. with the Rockville metro station	Expanded and underway as part of Bicycle Master Plan	Discussion: This project is underway. **Vote**: NA.
Generally, expand and improve City bike route network	Implemented and completed as part of Bicycle Master Plan	Discussion: This project is completed. **Vote**: NA.

III. TRUCK AND ARTERIAL TRAFFIC		
Community Recommendations	**City Responses**	**Discussion Points and Final Vote**
Reclaim jurisdiction of W. Montgomery Ave. and Great Falls Road from the State of Maryland	Great Falls Road transferred to City jurisdiction (2001)	Discussion: The City received over $500,000 of St. improvements from the State at time of transfer, but must allow trucks to use facility. **Vote**: NA.
Ban all through traffic (in excess of one ton capacity) on W. Montgomery Ave., Great Falls Road, and Maryland Ave. that does not service the residential section of West End.	Truck restriction signs limit access: 1) to Maryland Ave. from Great Falls Rd. to W. Jefferson St; 2) North or South to all residential streets along West Montgomery Ave.; 3) after exiting I-270 interchange to Maryland Ave., trucks allowed to use only Great Falls Rd. to access Town Center	Discussion: This project is completed (truck restriction signs are in place). Enforcement an issue. **Vote**: NA.
Place traffic signs at the I-270 interchanges that forbid truck traffic on Maryland Ave., W. Montgomery Ave., and Great Falls Road. Identify alternate routes for both truck traffic and other vehicular traffic. Promote use of these routes through distribution of information and updating of signage	Not implemented.	Discussion: Bob Bolcik recommended the following in a letter sent September, 2004. **1)** Limit access to Maryland Ave. and West Montgomery from Veirs Mill Rd. Re-sign MD Route 28 so that a) At MD586 and MD911, MD28 turns north/east. The portion of road from the interchange at I-270 and W. Montgomery to MD911 would no longer be designated MD28.; b) E. Gude becomes MD28. **2)** On I-270 NB place a sign indicating that Exit 4 serves at the "Rockville Town Center Business By-Pass" route; **3)** On I-270 SB place a sign indicating that I-370 traffic is routed onto Shady Grove Rd., which would serve as connect to (the new) MD28. **Vote**: None taken
Control speed on arterial roadways including Maryland Ave., Great Falls Road, and W. Montgomery Ave. via installation of speed-activated stop lights - OR – through St. reconfiguration and of traffic circles. *Priority Location*: Maryland Ave. between Monument St. and S. Washington St.	Speed indicator sign placed on Maryland Ave. 2004.	Discussion: Speeding still an issue on Maryland Ave.. **Vote**: NA.

IV. SPEEDING AND TRAFFIC ENFORCEMENT		
Community Recommendations	**City Responses**	**Discussion Points and Final Vote**
The West End Citizens Association should initiate a campaign in West End to report traffic violators. The Police Chief should continue writing letter campaign to reported violators	Not implemented.	Discussion: None. **Vote**: No vote.
The City should lobby the Maryland General Assembly for the following legislative goals: • Amend state law so municipalities can get back a greater portion of fines imposed • Permit the installation of cameras at high traffic intersections • Enact a mandatory driver education program for violators who have two moving violations in a three-year period	Speed cameras vetoed by Governor of Maryland (2003); Red light cameras installed in various locales	Discussion: None. **Vote**: NA (refer to "City response")
Free up police officers for stricter traffic enforcement	1. *Police Department Traffic Squad:* Police Dept. has established a three-member traffic unit, which is specially trained and assigned to address traffic enforcement issues 2. *Truck Inspections*: Police Dept. has trained and certified two (2) officers as Truck Inspectors. At least once a month, they complete a safety inspection of trucks traveling assigned roadways in Rockville. With redevelopment of Town Center, the officers will be concentrating their efforts on truck traffic attempting to travel W. Montgomery Ave.. 3. *Speed Indicator Signs*: Police Dept. places a portable speed indicator sign at strategic locations throughout the City. This sign provides drivers with instant feedback on how fast they are actually traveling. 4. *Red Light Camera Review and Enforcement*: Police Dept. is responsible for review and issuance of enforcement paperwork for red light violators caught on camera at one of the four (4) current camera locations in the City 5. *Directed Patrol Traffic Enforcement*: Through cooperation with the City Traffic and Engineering division, and through citizen input, the Police Dept. targets locations of high traffic violation. The Traffic Unit spends time at each of these locations. Hot spots in the WE include, but are not limited to: W. Montgomery Ave., Great Falls Rd., Mannakee St., and Nelson St.	Discussion: Participants reinforced idea of continued and increased police traffic enforcement. **Vote**: NA.

IV. SPEEDING AND TRAFFIC ENFORCEMENT		
Community Recommendations	**City Responses**	**Discussion Points and Final Vote**
Employ the following public relations techniques: • Run a continuing traffic information program on specific localities, with regular features in *Rockville Reports* • Provide the media and Rockville schools and colleges with news releases about efforts to improve traffic law enforcement • Handbill specific neighborhoods when speeding arrests increase dramatically • Devise a "teaser" bumper sticker for city vehicles and cars of concerned citizens • Organize citizens to mount demonstrations at problematic intersections	Not implemented.	Discussion: None. **Vote**: None taken.
Conduct a city-wide poll on attitudes about traffic law enforcement and safety	Not implemented.	Discussion: None **Vote**: None taken

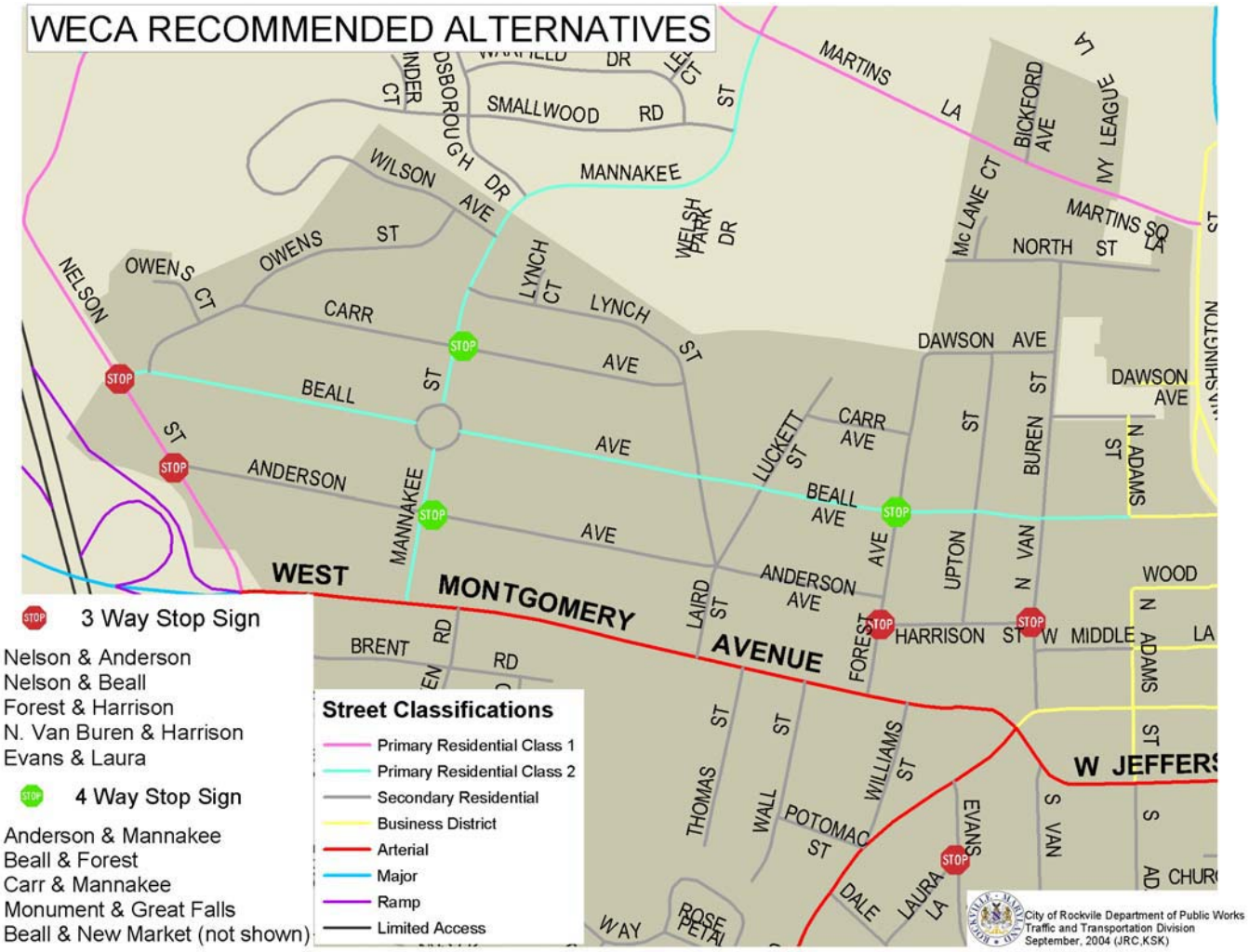
Follow-Up:

- City staff to provide information on the feasibility and the "pros and cons" of those measures that participants voted to implement.
- Bob Bolcik to write a summary of traffic calming measures that participants voted to implement. This summary is to be posted on the City's website and in the City paper, along with City staff recommendations.
- Conduct a meeting with all interested West End citizens. The purpose of this meeting would be to create a draft 2004 Traffic Calming plan, including an implementation schedule.
- It was suggested that a meeting be arranged to discuss the various topics within the proposed plan; including: 1)Look at a comprehensive solution for Adclare, Aberdeen, Nelson, West Montgomery, Mannakee, 2) Sidewalks on Luckett, between Carr and Beall, 3) Add crossing on MD28 between Laird and Nelson, and 4) Adopt a road sign on West Montgomery, replace existing signs (Dennis Cain)
- Staff to speak with Terry Treschuk about stricter enforcement of trucks exceeding 1 ton capacity using Maryland Ave., especially those making deliveries to Marlo Furniture Store.

Additional Traffic Calming Measures suggested: 1) Beall/Nelson, 2) Traffic calming devices on Nelson, 3) Traffic signal on MD 28, at Aberdeen, 4) Speed humps on Carr (and increase speed limit to 25 MPH), and 5) Install sidewalks on *both* sides of St. on Mannakee St. from Beall to Carr

The minutes of the July 20, 2004 meeting were approved.

ATTACHMENT D: MAP OF WECA PROPOSED RECOMMENDATIONS



ATTACHMENT E: STAFF REVIEW OF WECA RECOMMENDATIONS

Part I: Review of National Standards and Warrants

M E M O R A N D U M

November 18, 2004

TO: Larry Marcus, Chief, Traffic & Transportation Division

FROM: Emad Elshafei, P.E., P.T.O.E.,
Civil Engineer II – Traffic & Transportation Division

SUBJECT: All-Way Stop Controls at the West End – Final Report

This memorandum has been prepared by staff in reference to the West End community request to apply all-way Stop controls at twelve intersections. The purpose of this report is to explain the criteria applied by staff to assess each intersection, to provide information about the traffic study conducted to gather field condition, accident data and traffic volume data, and to provide specific recommendations to improve traffic operation and safety at some locations. The report ends with a summary and general recommendations.

Overall, staff recommends that all-way Stop controls should not be applied at any of these intersections due to the fact that neither the 2003 Manual on Uniform Traffic Control Devices (MUTCD) warrants nor the city "relaxed" warrants were met for such traffic control device. The MUTCD and the city "relaxed" traffic volume warrants need to be met for eight and six hours, respectively, but those warrants were not met at any single hour at any of the twelve intersections. The accident history warrants were not met either at any intersection during the latest available three-year period (2000-2002).

1. The Criteria:

1.a. Background:

During the 1980's, the Mayor and Council have passed a resolution adopting the guidelines of the Manual on Uniform Traffic Control Devices (MUTCD) to help determine the need for particular traffic controls. This manual is approved by the Federal highway Administrator as the National Standard for all traffic control devices installed on any St., highway, or bicycle trail open to public travel. In 1979, the City Traffic and Transportation Commission "relaxed" the

MUTCD (older version) requirements for all-way Stop control to better reflect conditions on residential Streets and the fact that many minor traffic accidents are no longer reported in Maryland. The following subsections highlight both the MUTCD and the City "relaxed" warrants.

1.b. MUTCD warrants for all-way Stop:

Justification for an all-way Stop at an intersection depends on three elements: traffic volumes, accident history, and field conditions. The warrants for all-way Stop are identified in the 2003 Edition of the MUTCD, and they are summarized below:

1.b.1. Traffic Volumes: The purpose of this warrant is to ensure the efficiency of traffic operation at the intersection with conflict movements. For example, it is not an efficient way to operate an intersection if 9 vehicles have to stop on the major road if there is only one vehicle traveling on the minor road during the same period of time. The MUTCD went as far as recommending that all-way Stop control is to be used where the volume of traffic on the intersecting roads is approximately equal. The requirements of this warrant, however, for a multi-way Stop sign installation were more reasonable: the vehicular volume entering the intersection from the major St. approaches (total of both approaches) averages at least 300 vehicles per hour for any eight hours of an average day, and during the same eight hours, the combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor St. approaches (total of both approaches) averages at least 200 units per hour. The MUTCD allows the use of 70 percent of the above values if the 85th-percentile approach speed of the major-St. traffic exceeds 40 mph.

1.b.2. Accident History: The purpose of this warrant is to ensure traffic safety at the intersection. The approach here is not to wait until accidents take place, but if there is a safety concern at an intersection, it will be reasonable to look into the all-way Stop control if the accidents are susceptible to correction by this new measure. The MUTCD warrants require five accidents per year of this kind of accidents (right and left-turn accidents and angle accidents).

1.b.3. Field Conditions: The MUTCD complements the warrants listed above by recognizing some other criteria that may be considered in an engineering study. They include left-turn conflicts, vehicle/pedestrian conflicts near locations that generate high pedestrian volumes, and sight distance issues when the road user, after stopping, is not able to reasonably safely negotiate the intersection unless conflicting cross traffic is also required to stop. As noted earlier, the MUTCD clearly states that Stop signs should not be used for speed control.

1.c. City "relaxed" warrants for all-way Stop:

As mentioned earlier, the City has "relaxed" the MUTCD (old version) requirements in 1979 for all-way Stop control to better reflect conditions on residential Streets and the fact that many minor traffic accidents are no longer reported in Maryland. Following MUTCD guidance,

however, the City does not install Stop signs for speed control. The "relaxed" city warrants for all-way stops are summarized below:

> 1.c.1. Traffic Volumes: The City "relaxed" warrants include at least 250 vehicles per hour passing through the intersection from all approaches for any six hours of an average day. During the same six hours, the combined vehicular and pedestrian volume from the minor St. must average at least 75 units per hour, and must equal or exceed 30% of the total vehicular volume.
>
> 1.c.2. Accident History: The City "relaxed" warrants require three accidents per year of a type susceptible to correction by all-way Stop control.
>
> 1.b.3. Field Conditions: Similar to the MUTCD, the City warrants recognized some other criteria that may be considered in an engineering study such as restricted visibility, vehicle/pedestrian conflicts near school or park areas, and when the intersection's geometrics may cause safety hazards.

On the basis of the above, staff conducted an engineering study for each of the twelve intersections requested by the WECA, and recommendation was provided based on both the MUTCD and the City "relaxed" warrants.

2. The Traffic Study:

This section summarizes the study's results and recommendations for each of the twelve intersections. A spreadsheet for each intersection summarizing the collected traffic volume and accident data is also attached to this memo.

The MUTCD warrants are required to be met for eight hours (versus six hours for the "relaxed" city warrants). In a memo dated October 27, 2004, staff recommended to only conduct 2-hour counts at some intersections during the morning peak period (7-9 AM), and possibly during the mid-day period (12-1 PM) and/or the PM peak period (4-6 PM) to support the intersection analysis, if needed. The rationale behind this recommendation is that counting traffic for 12 hours is time consuming and if the 2-hour count conducted during the morning peak period shows that the traffic volumes are far from meeting warrants, it will be most likely that the intersection will not meet warrants at any other hour of the day, let alone for the six or eight hours required by standards. Based on this recommendation, two-hour counts were conducted at 2 intersections, but more counts were conducted during the mid-day and evening peak periods (to accumulate a 6-hour count) at another two intersections. Staff also collected nine new mechanical counts to complement some data available from the last 2 years in order to provide counts for 24-hour periods at another seven intersections. Staff dedicated the data collection efforts during the last four for this study and managed to continue providing regular service to the residents. However, no turning movement counts or mechanical counts were conducted during this time at locations other than the West End.

Results and Recommendations:

Although the all-way Stop controls are not recommended, staff made an effort to look into other actions that might improve traffic operational characteristics and traffic safety at each intersection. These actions include restricting parking at the corners of the intersection, trimming trees and bushes to improve visibility, and installing "Cross Traffic Does Not Stop" signs under Stop signs that already exist at the intersection. A new traffic calming measure is also an option for speeding problems. Such recommendation was successfully implemented at the intersection of Baltimore Rd and Woodburn Rd. where 4-way Stop was not warranted and speeding on Baltimore Road was a concern.

The locations where the all-way Stop controls are requested include the following intersections:

<u>3-way Stop:</u>

1. Nelson St. and Anderson Ave.
2. Nelson St. and Beall Ave.
3. Forest Ave. and Harrison St.
4. N. Van Buren St. and Harrison St.
5. Evans St. and Laura Lane
6. Lynch St. and Carr Ave.
7. W. Argyle St. and S. Washington St.

<u>4-way Stop:</u>

8. Mannakee St. and Anderson Ave.
9. Mannakee St. and Carr Ave.
10. Forest Ave. and Beall Ave.
11. Monument St. and Great Falls Rd.
12. Beall Ave. and New Market

1. Nelson St. and Anderson Ave.:

Traffic coming out of Anderson Ave. is very low and only represents 1% to 3% of the total traffic volume at this intersection during different hours of the day. No accidents were recorded during the three-year period between 2000 and 2002. The 85th percentile speed on Nelson St. was 32 mph in the northbound direction and 34 mph in the southbound direction. A "No Parking" section has been established on the east side of Nelson St. north of the intersection to improve the sight distance for drivers coming out of Anderson Ave. and looking to the right side. The "No Parking" sign posted at this location has been displaced and a work order will be issued to re-install it. The only other possible improvement at this intersection is to increase the parking restriction section if residents feel that the sight distance needs improvement. In this case, city will need to coordinate with the resident at the northeast corner of the intersection who will be affected by any parking restriction modification.

2. Nelson St. and Beall Ave.

The situation here is similar to the intersection above. Traffic coming out of Beall Ave. represents 2% to 5% of the total traffic volume at this intersection. It increases to 7% between 5-6 PM. Only one accident is recorded (in 2000) during the three-year period between 2000 and 2002. Similar parking restriction is also posted at the east side of Nelson St. north of this intersection, and can be increased if needed, after coordinating with affected residents who might loose a parking space or two in front of their residence.

3. Forest Ave. and Harrison St.

This is one of two intersections where traffic counts were only conducted during the morning peak period. Only nine vehicles and two pedestrians came out of Harrison St. between 7-8 AM, and almost identical amount was recorded between 8-9 AM. Also, no accidents were recorded during the three-year period between 2000 and 2002. Finally, vehicle/pedestrian conflicts were not detected and sight distance issues do not exist.

4. N. Van Buren St. and Harrison St.

Due to the fact that traffic from the side St. (Harrison St.) consisted of 40% of the total intersection traffic volume, in addition to the morning peak period, turning movement counts were also collected during the mid-day (12-2 PM) and evening (4-6 PM) peak periods. The percentage of the side St. traffic decreased during the mid-day period (34% and 31% during 12-1 PM and 1-2 PM, respectively), and even dropped more during the evening peak period (25% and 22% during 4-5 PM and 5-6 PM, respectively). Although the percentage of the side St. traffic is relatively high compared to the intersections above, the volume did not reach the lowest required warrant (city "relaxed" warrant) of 75 vehicles per hour. Also, no accidents were recorded during the three-year period between 2000 and 2002, and other conflicts and sight distance issues were not detected.

5. Evans St. and Laura Lane

This is the other intersection where traffic counts were only conducted during the morning peak period. Only one vehicle and three pedestrians came out of Laura Lane between 7-8 AM, and four vehicles were recorded between 8-9 AM for the same movement. No accidents were recorded during the three-year period between 2000 and 2002. A possible improvement at this intersection is to install a Stop sign on Laura Lane. The sign is generally not needed at a "T-intersection" because it is the Maryland's "Boulevard Rule", but posting the sign might be beneficial. Traffic should even decrease at this intersection since "No Thru Traffic" sign was recently posted on Dale Drive at its intersection with Great Falls Road. It is possible that some drivers used Dale Drive and turn left on Laura Lane before they find themselves at its intersection with Evans St.. Another potential improvement is to restrict parking on the west side of Evans St. south of the intersection.

6. Lynch St. and Carr Ave.

Other than the fact that traffic volumes warrants were not met and no accidents were recorded during the three-year period between 2000 and 2002, drivers traveling southbound on Lynch St. will have to slow down before reaching the intersection of Lynch St. and Carr Ave. due to the speed hump located right north of the intersection. The fact that the hump is located near the intersection reduces any concerns about sight distance. The recorded 85th percentile speed on eastbound Lynch St. was 23 mph.

7. W. Argyle St. and S. Washington St.

Turning movement counts were collected on November 16, 2004, during the morning (7-9 AM), mid-day (12-2 PM), and evening (4-6 PM) peak periods. The percentage of the side St. (S. Washington St.) traffic was 21% and 18% between 7-8 AM and 8-9 PM, respectively, and increased during the evening peak period (39% and 43% between 4-5 PM and 5-6 PM, respectively). Although the percentage of the side St. traffic is relatively high, the volume did not reach the city "relaxed" warrant of 75 vehicles per hour. Also, no accidents were recorded during the three-year period between 2000 and 2002.

It worth noting that 87% of the side St. traffic coming out of S. Washington St. made a left turn towards Monroe St., and eastbound traffic on Argyle St. did not exceed 6 vehicles during the 6-hour count period which makes the conflict between the two movements almost non-existent. The two facts are related and can be explained by pointing out that drivers on Maryland Ave. are not allowed to go eastbound on Argyle St., and therefore, they use S. Washington St. instead, and then turn left on Argyle St.

The only sight distance issue that might cause a concern is for some bushes located on the right hand side for southbound traffic on S. Washington St.. The bushes need to be monitoring during spring and summer seasons, and possibly trimmed. This does not represent any concern due to the fact that an average of only 1 vehicle/hour was recorded coming eastbound on Argyle St. during the 6-hour count as explained earlier.

8. Mannakee St. and Anderson Ave.

Traffic coming out of Anderson Ave. is relatively low and represents less than 11% of the total traffic volume at this intersection, except for the morning peak periods when it is 42% and 28% between 7-8 AM and 8-9 PM, respectively. Due to the fact that Anderson Ave. has a "Do Not Enter" sign posted for the eastbound traffic at its intersection with Mannakee St., the majority of the eastbound traffic at this intersection makes a right-turn on southbound Mannakee St. during this morning peak period. A potential solution to even reduce the traffic at this intersection is to post a "No Right Turn" sign for the northbound traffic on Nelson St. at its intersection with Anderson Ave.. A disadvantage to this solution is that traffic will increase on Beall Ave. because drivers will use it as an alternative to cut through the residential Streets to reach the town center.

Although the accident warrants were not met, three accidents were recorded during the three-year period between 2000 and 2002 (one in 2000 and two in 2001). The 85th percentile speeds on Mannakee St. were 31 and 23 mph in the northbound and southbound directions, respectively, which does not suggest a speeding problem at the intersection. "No Parking" signs are posted on both sides of Mannakee St. north of this intersection, and on the east side south of the intersection, which is improving the sight distance. However, sight distance can be improved for eastbound traffic by posting parking restriction signs on the west side of Mannakee St., south of the intersection, and for the westbound traffic by trimming the bushes on the southeast corner of the intersection (in front of #560 Anderson Ave.). These bushes are located in the public right of

way and efforts have been made in the past to remove the bushes. It is also recommended to post "Cross Traffic Does Not Stop" signs under Stop signs that already exist at the intersection.

9. Mannakee St. and Carr Ave.

Two-hour turning movement count was conducted during the AM peak period on February 25, 2004 to assess the need for a 4-way Stop control at the intersection and warrants were not met.

New mechanical counts were performed on Mannakee St. on November 9, 2004 to complement other mechanical counts previously conducted on Carr Ave. in 2002. The counts confirmed the results obtained earlier this year. In summary, the side St. (Carr Ave.) represented no more than 14% of the traffic at the intersection during a 12-hour period. It should be also noted that the traffic volume did not exceeded 28 vehicles/hour on Carr Ave. at any given hour. No accidents were recorded at this intersection during the three-year period between 2000 and 2002. Sight distance is ideal on both sides and was not recognized as a problem.

10. Forest Ave. and Beall Ave.

Six-hour count was conducted on September 26, 2001 (7-9 AM, 11:30 AM - 1:30 PM, and 4-6 PM) to assess the need for a 4-way Stop control at this intersection and warrants were not met. In summary, traffic on the side St. (Forest Ave.) represented 19% of the traffic at the intersection during each of the morning peak hours. The through traffic (crossing Beall Ave.) on Forest St. did not exceed 8 vehicles at any of the 6 hours neither in the northbound nor in the southbound directions, while through traffic on Beall Ave. was as high as 223 in the eastbound direction alone (8-9 AM).

Since the all-way Stop was not warranted during this time, "Cross Traffic Does Not Stop" signs were posted under Stop signs on Forest Ave. in an attempt to improve traffic operation and safety at this intersection. Also, by mid-2003 – as a response to the Mayor and Council initiatives - the speed fines were doubled in front of Beall Elementary School, one block west of this intersection where the posted speed limit is 15 mph.

New traffic counts were conducted on Beall Ave. on November 9, 2004, to complement 2-month old counts conducted on Forest Ave.. The traffic volumes recorded at the intersection were less than the ones recorded in 2001. The percentage of the side St. (Forest Ave.) traffic exceeded 30% at one occasion (32% between 10-11 AM), but averaged around 22% throughout the day. The highest recorded side St. hourly traffic was 55, but does not meet the city "relaxed" warrant of 75 vehicles/hour.

It was also noted that the 85th percentile speed on Beall Ave. was 30 mph in the eastbound direction, only one mph less that the 85th percentile speed recorded in September 2001. This is an indication that the posted speed limit of 25 mph is not fully observed and doubling fines in front of Beall Elementary School has no effect on speed reduction on Beall Ave. near Forest Ave.. The accident warrants at this intersection were not met, however, three accidents were recorded during the three-year period between 2000 and 2002 (two in 2001 and one in 2002).

The problem at this intersection is a combination of speed on Beall Ave. and sight distance limited by some bushes, notably for the southbound traffic. Staff recommends several action items before an implementation of all-way Stop can take place:

a. Relocate the Stop sign posted at the north leg of the intersection further south. This will allow drivers to stop at a position where more sight distance will be available.
b. Trim bushes at the northeast corner of the intersection.
c. Monitor the branches of the tree located at the northwest corner of the intersection, and trim if needed before they get lower and start to reduce visibility.
d. Install a speed hump (or other traffic calming device such as raised intersection) on Beall Ave. in the vicinity of the intersection.
e. Increase police enforcement.

11. Monument St./Autumn Wind Way and Great Falls Road

A two-hour count was conducted during the morning peak period on September 15, 2004, at this intersection. The available numbers show that the volume warrants were not met. More traffic data were collected in November 2004 to complement previously collected data, and it was confirmed that warrants are not met.

Traffic coming out of Monument St. and Autumn Wind Way combined was under 10% of the total traffic volume at this intersection, except during the morning hour between 7-8 AM when this number reached 14%. Also, no accidents were recorded during the three-year period between 2000 and 2002. Sight distance does not represent a major concern, but it needs to be monitored for the traffic coming out of Monument St. looking left on Great Falls Road.

Due to the fact that the 85th percentile speed on Great Falls Road was 40 mph in the southbound direction and 39 mph in the northbound direction, the 30 percent reduction of the standard values of the minimum vehicular volume warrants allowed by the MUTCD was taken into consideration.

12. Beall Ave. and Market St.

This intersection does not exist at this time, and therefore, no traffic counts were conducted at this location. Future analysis will be performed based on the traffic expected at the intersection. It is most likely that all-way Stop control or even a traffic signal will not be recommended at this location due to the fact that Market St. is very close to N. Washington St., which makes their respective intersections with Beall Ave. only 250 feet apart. This short distance will cause traffic congestions at both intersections. A possible solution to improve safety at the new intersection is to restrict northbound traffic coming out of the Market St. to right-turn only movement.

3. Summary and General Recommendations:

All-way Stop controls were requested at twelve intersections in the West End area, and a traffic engineering study was conducted at each intersection. Both warrants established by the MUTCD and the City of Rockville were not met at any intersection.

It is also recommended to start an educational program for Rockville residents, such as publicizing information or distributing pamphlets, to inform them about the advantages and disadvantages of posting traffic control devices. The devices include Stop signs, traffic signals, speed limit signs, "Children at Play" signs, etc. Similar programs have been applied in other cities and counties throughout the country. Such information will be very informative and will educate the residents about what might work or not work to address their concerns. This will also allow city staff to allocate resources in investigating more effective solutions for specific traffic problems.

In deploying all-way Stop control, it should be reasonably certain that the benefits outweigh the costs, and hence our use of the MUTCD warrants. In addition to an increased probability of accidents (particularly of the rear-end type), unjustified Stop signs also waste energy, contribute to air pollution, and encourage disregard of traffic controls generally. It should be also noted that several studies have proven that Stop signs do not stop speeding, but can increase both noise and air pollution.

Stop signs are also not effective unless enforced, and the reality is that the City's police department does not have the resources to enforce these signs on a frequent, consistent basis. General complaints have been received from city residents (for example at the King Farm Development) in reference to Stop signs being ignored. This can cause more harm than good to the public.

A final recommendation is in reference to the city "relaxed" warrants. These warrants represent about 50% of the warrants specified in the MUTCD. Although the reason behind this reduction is to better reflect conditions on city residential Streets and due to the fact that many minor traffic accidents are not reported, the reason behind the specific amount of "relaxation" has not been documented. City staff, with the help of the current Traffic and Transportation Commission, can further investigate if the "relaxed" warrants need to be re-evaluated.

Part 2: Review of Field Conditions

November 18, 2004

TO: Emad Elshafei, Civil Engineer II

FROM: Joseph Cutro, P.E., Traffic Engineering Consultant

SUBJECT: West End All-way STOP proposals

At your request, I've independently examined and evaluated physical conditions at 11 West End intersections for which all-way STOP control is currently under consideration. Studies of this kind focus mainly on the adequacy of sight distance from the controlled intersection approach(es) under prevailing conditions. Using AASHTO and Montgomery County DPW&T guidelines, the following assumptions about prevailing speeds and sight distance requirements have been made for each of three St. classifications:

	Prevailing Speed	Required Sight Distance
Major primaries (e.g., Nelson St., Great Falls Road)	35 mph	250'
Minor primaries (e.g., Mannakee St., Beall Ave.)	30	200'
Secondary Streets (e.g., Harrison St., Evans St.)	25	150'

Please note that the prevailing speed is not the same as the speed limit, which is 25 mph for all Streets examined herein. For safety's sake, the prevailing speed assumed must reflect a "reasonable worst case", which in standard practice is usually represented by the 85th percentile speed. The speeds selected would appear to be appropriate, as rounded to the 5-mile increments necessary to use the AASHTO and Montgomery County tables.

Also note that these evaluations do not constitute complete warrant studies for all-way STOP control. My reviews do not entail an examination of vehicular and pedestrian activity (volume) or collision data at the intersections--additional factors that should be considered in any complete study of intersection control. It is my understanding that these factors are to be examined in your own analyses.

Nelson St./Anderson Ave.: Controlled approach: Anderson (1)

- From Anderson toward south: Sight distance is adequate as observed. Signed parking clearance along Nelson is 35' including bus stop area. Sight distance could be limited by legally parked cars if present. Shrubs in yard of corner property (#9 Nelson) could be future problem, but not at this time.
- From Anderson toward north: Sight distance is adequate as observed. Signed parking clearance along Nelson is 35', although parking sign appears to be missing. Sight distance could be limited by legally parked cars if present.

- Other considerations: Sidewalk and curb ramp on west side of Nelson, serving bus stop but little else. Acute (non-perpendicular) angle of intersection. Stopping would be more difficult than usual on northbound downgrade. Recently installed bike lane provides greater "margin of safety" for controlled approach than formerly.

- Recommendations: Restore/install NPAT sign at marked location on Nelson St. north of intersection. Consider longer parking clearances along Nelson.

Nelson St./Beall Ave.: Controlled approach: Beall (1)

- From Beall toward south: Sight distance is adequate as observed. Signed parking clearance along Nelson is 60' including bus stop area. Sight distance could be limited by legally parked cars if present. Shrubs in yard of corner property (#9 Nelson) could be potential problem in future, but not at this time.
- From Beall toward north: Sight distance is adequate as observed. Signed parking clearance along Nelson is 55', although parking sign appears to be missing. Sight distance could be limited by legally parked cars if present.
- Other considerations: Bus stop on west side of Nelson, but no connecting sidewalk or curb ramp. Stopping would be more difficult than usual on northbound downgrade. Recently installed bike lane provides greater margin of safety for controlled approach than formerly. As a primary St., Beall comes closer than Anderson to matching Nelson in importance (would yield better driver compliance with STOP signs).

- Recommendations: Consider longer parking clearances along Nelson.

Mannakee St./Anderson Ave.: Controlled approaches: Anderson (2)

- From EB Anderson toward north: Sight distance is adequate as observed. Continuous NPAT posted on west side of Mannakee.
- From EB Anderson toward south: Sight distance is adequate as observed. Parking is permitted up to corner, but within added paved shoulder that keeps sight line clear.
- From WB Anderson toward north: Sight distance is adequate as observed. Continuous NPAT on east side of Mannakee.
- From WB Anderson toward south: Sight line is obstructed. Longstanding problem of shrubbery and other plantings (at side of 560 Anderson) *within public right-of-way*. Large tree on this corner is also a factor, but not critical. Continuous NPAT along east side of Mannakee.
- Other considerations: Intersection history available in archive files. No sidewalks on Anderson east of intersection.

- Recommendations: Remove/relocate shrubbery and flowers on southeast corner to location outside Mannakee St. right-of-way.

Mannakee St./Carr Ave.: Controlled approaches: Carr (2)

- From EB Carr toward north: Sight distance is adequate as observed. Signed parking clearance of 65' on west side of Mannakee.
- From EB Carr toward south: Sight distance is adequate as observed. Signed parking clearance of 55' on west side of Mannakee.

  - From WB Carr toward north: Sight distance is adequate as observed. Signed parking clearance of 50' on east side of Mannakee.
  - From WB Carr toward south: Sight distance is adequate as observed. Signed parking clearance of 65' on east side of Mannakee.
  - Other considerations: Mannakee approaches are well-signed (FYG School Crossing signs) and marked (hatched crosswalks). Parking clearances here are longer than usual and serve as an excellent example for other intersections.
- Recommendations: Consider left-side School Crossing signs to supplement those existing.

Lynch St./Carr Ave.: Controlled approach: Carr (1)

  - From Carr toward north: Sight distance is adequate as observed, despite acute intersection angle and unfavorable horizontal curve further north on Lynch. Homeowner appears to keep sight line clear through yard. No parking restrictions.
  - From Carr toward south: Sight distance is adequate as observed. No parking restrictions.
  - Other considerations: Sidewalk and curb ramp available on east side of Lynch, serving elementary school and path to Welsh Park. Acute angle of intersection. Speed hump and associated signing located just north of intersection—too close to intersection to be compatible with a STOP sign. Sharp horizontal curve further north on Lynch would also make proposed STOP a surprise for southbound motorists.
- Recommendations: DO NOT install all-way STOP on basis of physical conditions cited above. Consider parking clearances along west side of Lynch, particularly north of intersection. Consider marked and signed school crosswalk and additional curb ramp on south leg of Lynch, if consistent with a safe-route-to-school plan. DO NOT consider a crosswalk on north leg of Lynch—it's too close to horizontal curve cited above. Work with homeowner on northwest corner to keep sight line clear of obstructions.

Beall Ave./Forest Ave.: Controlled approaches: Forest (2)

  - From NB Forest toward east: Sight distance is adequate as observed. Hillcrest east of intersection does not obstruct sight line—appearance to the contrary is an optical illusion. Shrub in yard of corner property (419 Beall) could be future problem, but not at this time.
  - From NB Forest toward west: Sight distance is adequate as observed. Shrubbery behind Beall sidewalk does not appear to be a problem as viewed from normal stopping point.
  - From SB Forest toward east: Sight line is obstructed, due to line of high, continuous shrubbery along north side of Beall (side of 203 Forest Ave.). Shrubbery is located well *within public right-of-way*, with face as close as four feet from roadway edge. (R/W extends about 12 feet from roadway edge.) Hillcrest east of the intersection is not a problem.
  - From SB Forest toward west: Sight line is partially obstructed by a low tree limb on corner property--affects only vehicles with higher driver eye-heights, like vans and school buses. Tree is on private property (address not readily identifiable).

- Other considerations: Intersection history available in archive files. Continuous NPAT seems to be in force on both sides of Beall, but posting is inconsistent. Near-miss right angle (SB vs. WB) conflict observed circa 2:30 PM, 11/17/04.

- Recommendations: Remove shrubbery on northeast corner along and within Beall Ave. right-of-way. Work with homeowner on northwest corner to remove partially-obstructing tree limb.

Forest Ave./Harrison St.: Controlled approach: Harrison (1)

- From Harrison toward north: Sight distance is adequate as observed. No parking restrictions posted.
- From Harrison toward south: Sight distance is adequate as observed. No parking restrictions posted.
- Other considerations: No sidewalks on either side of Harrison. Existing sidewalk on west (only) side of Forest, opposite Harrison.
- Recommendations: None at this time.

N. Van Buren St./Harrison St.: Controlled approach: Harrison (1)

- From Harrison toward north: Sight distance is adequate as observed. Continuous NPAT along west side of N. Van Buren.
- From Harrison toward south: Sight distance is adequate as observed. Continuous NPAT along west side of N. Van Buren. New shrub on private property (200 Harrison) could be a problem in future, but not at this time.
- Other considerations: No sidewalk on either side of Harrison, or on east side of N. Van Buren opposite Harrison (i.e., this is not a good pedestrian crossing location).
- Recommendations: None at this time.

Great Falls Road/Monument St./Rose Petal Way:
Controlled approaches: Monument and Rose Petal (directly opposite each other)

- From EB Rose Petal toward north: Sight distance is adequate as observed. Newly planted trees are well spaced and "picket fence" effect should continue to yield adequate sight lines.
- From EB Rose Petal toward south: Sight distance is adequate as observed. Newly planted trees are well spaced and "picket fence" effect should continue to yield adequate sight lines.
- From WB Monument toward north: Sight distance is adequate as observed.
- From WB Monument toward south: Sight line is partially obstructed due to high backslope and overhanging tree limbs. Situation can be improved considerably with judicious tree trimming.
- Other considerations: Continuous NPAT along both sides of Great Falls Road. South leg of Great Falls has marked (including hatching) and properly signed pedestrian crosswalk, as well as bus stops on both sides. While not a primary St., Rose Petal appears to be "formidable" enough to encourage higher compliance levels by motorists prospectively having to stop on Great Falls. The intersection's position

midway between arterials (Maryland Ave. and W. Montgomery Ave.) would also be a mitigating factor in locating an all-way STOP here.

- Recommendations: Remove low tree limbs (3 or 4) along east side of Great Falls south of the intersection.

Evans St./Laura Lane: Controlled approach: Laura Lane (1)

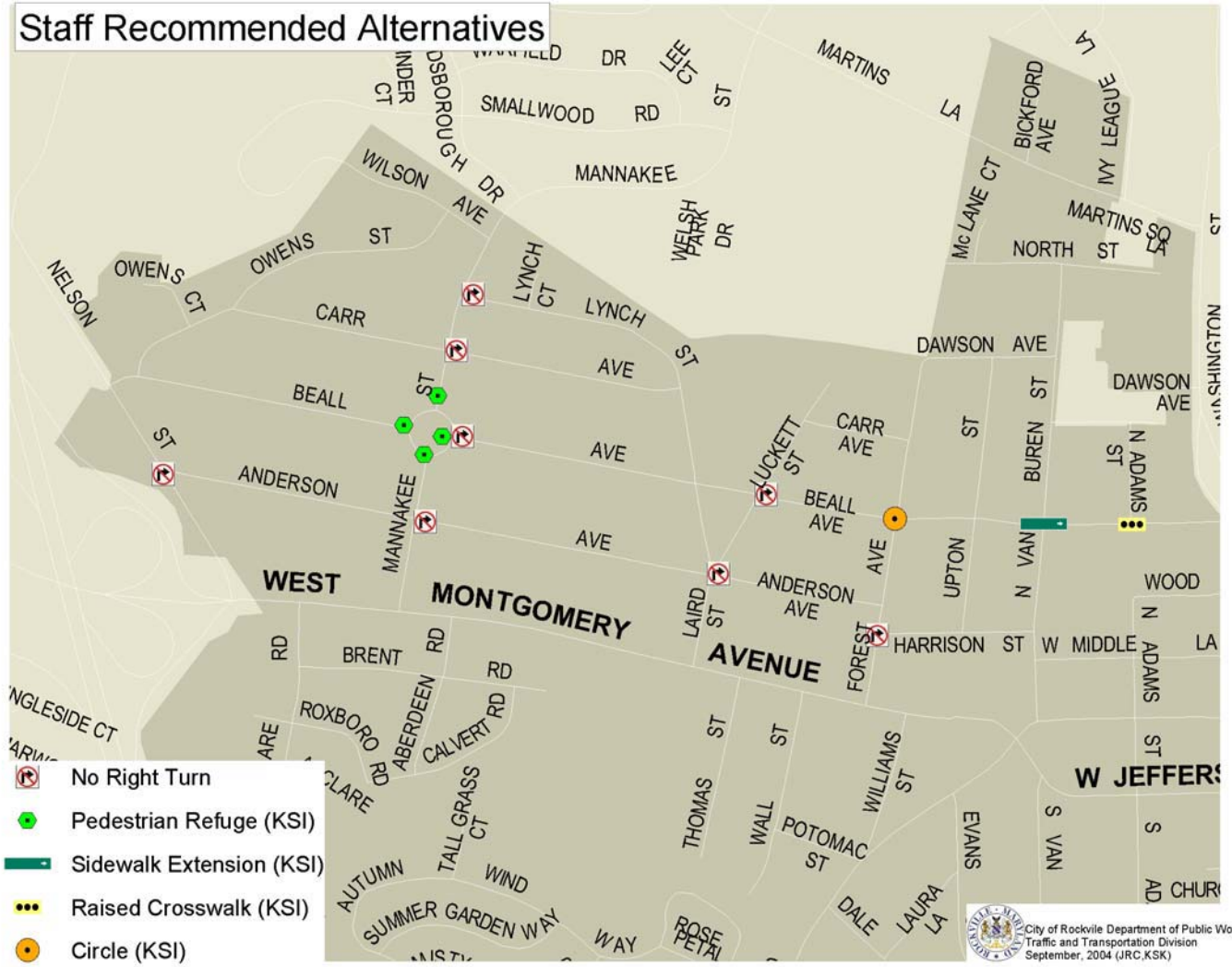
- From Laura Lane toward east: Sight distance is adequate as observed, despite (very) acute angle of intersection. No parking restrictions posted. Sight distance could easily be limited by legally parked cars if present.
- From Laura Lane toward west: Sight distance is adequate as observed. Large overhanging spruce tree is too far away to affect evaluation. No parking restrictions posted.
- Other considerations: No sidewalks on either St..
- Recommendations: Prohibit parking (NPAT) on south side of Evans St., from Laura Lane to 100' eastward. The corner "point" area appears to be public property and no residences should be directly affected.

Argyle St./S. Washington St.: Controlled approach: S. Washington (1)

- From S. Washington toward east: Sight distance is adequate as observed, although periodic (seasonal) trimming of shrubbery and undergrowth appears to be needed to maintain adequate sight line. Continuous NPAT posted on north side of Argyle.
- From S. Washington toward west: Sight distance is partially obstructed due to shrubbery within the acute angle of the intersection. A hillcrest west of the intersection is also a limiting factor. An important mitigating consideration is the near-absence of approaching eastbound traffic, due to a full-time entry restriction at the Maryland/Argyle intersection. A speed hump west of the intersection also serves to slow the infrequent traffic that does approach.
- Other considerations: Acute angle of intersection as noted above. No sidewalks on south side of Argyle St. opposite intersection. An asphaltic path running along north side of Argyle (east of intersection) and east side of S. Washington is isolated from the intersection. Speed hump and associated signing located just east of the intersection—too close to intersection to be compatible with a STOP sign.

Recommendations: On the northeast corner, monitor and periodically trim overgrowth to maintain adequate sight line. This is all City right-of-way. On the northwest corner, work with homeowner to relocate selected shrubs and open up an adequate sight line.

ATTACHMENT F: MAP OF STAFF RECOMMENDED TRAFFIC CONTROLS



ATTACHMENT G: SIDEWALK ESTIMATES AND METHODOLOGY

Methodology: In conducting sidewalk cost estimates, three major factors have been considered: 1) Removal of Trees/Vegetation; 2) Relocation of Utility Poles; and 3) Physical Improvements to Sidewalk Infrastructure. The first factor has been broken down further, assigning cost according to the size of trees requiring removal. The third factor has been broken into three subcomponents: a) Installation of Concrete Sidewalk; b) Installation of Curb and Gutter; and c) Addition of Driveway Aprons. The first sub-component (a), the Installation of Concrete Sidewalk, represents a composite of steps in the installation process; specifically, this means costs of labor and materials for the final concrete layer, base stone work, earthwork and grading, sod, and meter / cleanout adjustments. When all these steps were added together, they comprised a total cost of $40 per Linear Foot. To cover the likely occurrence of difficult issues on portions of the sidewalk routes, this figure was increased by 50%.

Location	Activity	Duration	Unit	Amount (# of units)	Cost Per Unit	Total Cost
Lynch St. from Beall Ave. to Anderson Ave ***(East Side)***	Removal of Trees/Vegetation					
	Small/Mid (12-17.9" DBH)		Tree	2	$300	$600.00
	Mid/Large (24-35.9" DBH)		Tree	2	$1,080	$2,160.00
	Relocation of Utility Poles		Pole	4	$20,000	$80,000.00
	Sidewalk Infrastructure					
	Installation of Concrete Sidewalk		LF	385	$60	$23,100.00
	Installation of New Concrete Curb and Gutter		LF	385	$40	$15,400.00
	Addition of Concrete Driveway Aprons		Apron	1	$1,500	$1,500.00
	Total Cost for East Side of Lynch =					**$122,760.00**
Lynch St. from Beall Ave. to Anderson Ave ***(West Side)***	Removal of Trees/Vegetation					
	Small (0-5.9" DBH)		Tree	4	$30	$120.00
	Mid-Size (24" Diameter)		Stump	1	$144	$144.00
	Mid/Large (36-49.9" DBH)		Tree	2	$1,440	$2,880.00
	Large (50-59.9" DBH)		Tree	1	$1,800	$1,800.00
	Relocation of Utility Poles		Pole	0	$20,000	$0.00
	Sidewalk Infrastructure					$0.00
	Installation of Concrete Sidewalk		LF	420	$60	$25,200.00
	Installation of New Concrete Curb and Gutter		LF	420	$40	$16,800.00
	Addition of Concrete Driveway Aprons		Apron	3	$1,500	$4,500.00
	Total Cost for West Side of Lynch =					**$51,444.00**

Sidewalk construction would also require the removal of a resident's extensive hedgerow.

Cost for stump removal = $6 per diameter inch

Lynch St. from Beall Ave. to Anderson Ave ***(East Side) -*** *Mike Wilhelm's Brick Sidewalk Estimate*	Removal of Trees/Vegetation	40	Tree	4	$1,400	$5,600.00
	Relocation of Utility Poles	40	Pole	4	$20,000	$80,000.00
	Sidewalk Installation					$0.00
	Remove Existing Asphalt Driveways	5	SY	50	$20	$1,000.00
	Remove Existing Asphalt Curb	5	LF	385	$5	$1,925.00
	Remove, Dispose of Existing Concrete/Asphalt Sidewalks	5	SY	200	$15	$3,000.00
	Remove, Dispose of Unsuitable Earth or Subgrade Material	5	CY	100	$40	$4,000.00
	Install CR-6 or RC-6 Aggregate Base	5	Ton	70	$30	$2,100.00
	Install Concrete for Curb and Gutter and 4” Finished Sidewalk	10	CY	20	$350	$7,000.00
	Install Concrete for Brick and Unit Paver Base	10	CY	50	$300	$15,000.00
	Place Earth Backfill Including Compaction	5	CY	50	$30	$1,500.00
	Install Tensar Geo-grid BX1100	5	SY	225	$5	$1,125.00
	Install 2” Unit Pavers, Sand Leveling Course & Joints	5	SY	175	$150	$26,250.00
	Install 3” Unit Paves, Sand Leveling Course & Joints	5	SY	50	$200	$10,000.00
	Install Mirafi 600X Sand Retention Fabric	5	SY	225	$5	$1,125.00
	Install New Concrete Curb and Gutter	5	LF	385	$40	$15,400.00
	Solid Sodding	5	SY	200	$6	$1,200.00
	Inlet protection	5	Each	2	$1,000	$2,000.00
	Topsoil	5	SY	200	$10	$2,000.00
	Total Cost for East Side of Lynch =					**$180,225.00**
Luckett St. from Anderson Ave. to Beall Ave. ***(East Side)***	Removal of Trees/Vegetation					$0.00
	Relocation of Utility Poles		Pole	0	$20,000	$0.00
	Sidewalk Infrastructure					$0.00
	Installation of Concrete Sidewalk		LF	450	$60	$27,000.00
	Installation of New Concrete Curb and Gutter		LF	450	$40	$18,000.00
	Addition of Concrete Driveway Aprons		Apron	5	$1,500	$7,500.00
	Total Cost for East Side of Luckett =					**$52,500.00**
Luckett St. from Anderson Ave. to Beall Ave. ***(West Side)***	Removal of Trees/Vegetation					
	Small/Mid (12-17.9" DBH)		Tree	2	$300	$600.00
	Mid/Large (24-35.9" DBH)		Tree	1	$1,080	$1,080.00
	Mid/Large (36-49.9" DBH)		Tree	2	$1,440	$2,880.00
	Relocation of Utility Poles		Pole	0	$20,000	$0.00
	Sidewalk Infrastructure					$0.00
	Installation of Concrete Sidewalk		LF	405	$60	$24,300.00
	Installation of New Concrete Curb and Gutter		LF	405	$40	$16,200.00
	Addition of Concrete Driveway Aprons		Apron	1	$1,500	$1,500.00
	Total Cost for West Side of Luckett					**$46,560.00**

Sidewalk construction would also require the removal of a resident's extensive hedgerow.

Mannakee St. from Beall Ave. to Carr Ave. ***(West Side)***	Removal of Trees/Vegetation					
	Small (0-5.9" DBH)		Tree	1	$30	$30.00
	Mid-Size (18-23.9" DBH)		Tree	2	$660	$1,320.00
	Relocation of Utility Poles		Pole	0	$20,000	$0.00
	Sidewalk Infrastructure					$0.00
	Installation of Concrete Sidewalk		LF	257	$60	$15,420.00
	Installation of New Concrete Curb and Gutter		LF	0	$40	$0.00
	Addition of Concrete Driveway Aprons		Apron	0	$1,500	$0.00
	Total Cost for West Side of Mannakee					**$16,770**
Harrison St. ***(North Side)***	Removal of Trees/Vegetation					
	Small (0-5.9" DBH)		Tree	2	$30	$60.00
	Mid/Large (36-49.9" DBH)		Tree	2	$1,080	$2,160.00
	Large (50" Diameter)		Stump	1	$300	$300.00
	Relocation of Utility Poles		Pole	1	$20,000	$20,000.00
	Sidewalk Infrastructure					$0.00
	Installation of Concrete Sidewalk		LF	730	$60	$43,800.00
	Installation of New Concrete Curb and Gutter		LF	0	$40	$0.00
	Addition of Concrete Driveway Aprons		Apron	0	$1,500	$0.00
	Total Cost for North Side of Harrison					**$66,320**
Harrison St. ***(South Side)***	Removal of Trees/Vegetation					
	Mid/Large (36-49.9" DBH)		Tree	2	$1,440	$2,880.00
	Relocation of Utility Poles		Pole	3	$20,000	$60,000.00
	Sidewalk Infrastructure					$0.00
	Installation of Concrete Sidewalk		LF	742	$60	$44,520.00
	Installation of New Concrete Curb and Gutter		LF	0	$40	$0.00
	Addition of Concrete Driveway Aprons		Apron	0	$1,500	$0.00
	Total Cost for South Side of Harrison					**$107,400**
Forest Ave. from Beall Ave. to Dawson Ave. ***(West Side)***	Removal of Trees/Vegetation					
	Small/Mid (12-17.9" DBH)		Tree	1	$300	$300.00
	Mid-Size (24-35.9" DBH)		Tree	2	$1,080	$2,160.00
	Relocation of Utility Poles		Pole	0	$20,000	$0.00
	Sidewalk Infrastructure					$0.00
	Installation of Concrete Sidewalk		LF	805	$60	$48,300.00
	Installation of New Concrete Curb and Gutter		LF	400	$40	$16,000.00
	Addition of Concrete Driveway Aprons		Apron	3	$1,500	$4,500.00
	Total Cost for West Side of Forest					**$71,260.00**

3 poles are located on this segment, but sidewalk would run behind them

It might be possible for the one pole on the North side to be avoided

Six (6) poles are located on the South side but only 3 present problems

Forest Ave. from Beall Ave. to Dawson Ave. ***(East Side)***	Removal of Trees/Vegetation					
	Mid-Size (18-23.9" DBH)		Tree	4	$660	$2,640.00
	Relocation of Utility Poles		Pole	3	$20,000	$60,000.00
	Sidewalk Infrastructure					$0.00
	Installation of Concrete Sidewalk		LF	795	$60	$47,700.00
	Installation of New Concrete Curb and Gutter		LF	285	$40	$11,400.00
	Addition of Concrete Driveway Aprons		Apron	2	$1,500	$3,000.00
	Total Cost for East Side of Forest					**$124,740.00**
Argyle St. from Monroe St. to Maryland Ave. ***(North Side)***	Removal of Trees/Vegetation					
	Small (0-5.9" DBH)		Tree	5	30	$ 150.00
	Mid/Large (24-35.9" DBH)		Tree	2	1080	$ 2,160.00
	Relocation of Utility Poles		Pole	3	$20,000	$ 60,000.00
	Sidewalk Infrastructure					
	Installation of Concrete Sidewalk		LF	970	$60	$58,200.00
	Installation of New Concrete Curb and Gutter		LF	0	$40	$0.00
	Addition of Concrete Driveway Aprons		Apron	0	$1,500	$0.00
	Total Cost for North Side of Argyle					**$120,510.00**
Argyle St. from Monroe St. to Maryland Ave. ***(South Side)***	Removal of Trees/Vegetation					
	Small (0-5.9" DBH)		Tree	1	$30	$30.00
	Mid-Size (18-23.9" DBH)		Tree	1	$660	$660.00
	Large (50-59.9" DBH)		Tree	8	$1,800	$14,400.00
	Relocation of Utility Poles		Pole	1	$20,000	$20,000.00
	Sidewalk Infrastructure					$0.00
	Installation of Concrete Sidewalk		LF	1090	$60	$65,400.00
	Installation of New Concrete Curb and Gutter		LF	0	$40	$0.00
	Addition of Concrete Driveway Aprons		Apron	0	$1,500	$0.00
	Total Cost for South Side of Argyle					**$100,490.00**
Anderson Ave. from Nelson St. to Forest St. ***(North Side)***	Removal of Trees/Vegetation					
	Small (0-5.9" DBH)		Tree	8	$30	$240.00
	Mid-Size (18-23.9" DBH)		Tree	4	$660	$2,640.00
	Large (50-59.9" DBH)		Tree	2	$1,800	$3,600.00
	Relocation of Utility Poles		Pole	1	$20,000	$20,000.00
	Sidewalk Infrastructure					
	Installation of Concrete Sidewalk		LF	3570	$60	$214,200.00
	Installation of New Concrete Curb and Gutter		LF	2290	$40	$91,600.00
	Addition of Concrete Driveway Aprons		Apron	23	$1,500	$34,500.00
	Total Cost for North Side of Anderson					**$366,780.00**

Altogether, 7 poles are present, but only 3 seem to present problems

cdelfs:
This stretch of Argyle measures 1060 LF but concrete sidewalk exists on 90 of these LF

Some severe slope issues could make installation much more costly or infeasible

The stretch of road between Nelson and Mannakee would be least costly because curb/gutter and aprons are present. It is also the most feasible segment with re. to tree and utility poles.

Anderson Ave. from Nelson St. to Forest St. ***(South Side)***	Removal of Trees/Vegetation					
	Small (6-11.9" DBH)		Tree	6	$120	$720.00
	Mid/Large (36-49.9" DBH)		Tree	18	$1,440	$25,920.00
	Relocation of Utility Poles		Pole	13	$20,000	$260,000.00
	Sidewalk Installation					$0.00
	Installation of Concrete Sidewalk		LF	3530	$60	$211,800.00
	Installation of New Concrete Curb and Gutter		LF	2285	$40	$91,400.00
	Addition of Concrete Driveway Aprons		Apron	27	$1,500	$40,500.00
	Total Cost for South Side of Anderson					**$630,340.00**
Beall St. from Nelson St. to Lynch St. ***(North Side)***	**Based upon engineer's assessment, extending the width of asphalt sidewalk to 4' between Beall Elementary School and Nelson Street would cost approximately:**					
	Total Cost for North Side of Beall					**$40,000.00**
	TOTAL COST OF ALL WEST END SIDEWALK IMPROVEMENTS					**$1,877,874.00**

Twenty-seven (26) poles are present but only an estimated half of these act as obstacles